

Extensive Reference List for the AirGIS System

List compiled April 2011

Descriptions of the AirGIS System

AirGIS – address based

Jensen, S.S. (1998): Mapping Human Exposure to Traffic Air Pollution using GIS. Journal of Hazardous Materials **61**/1-3 (1998), pp. 385-392.

Jensen, S.S. (1999): A Geographic Approach to Modelling Human Exposure to Traffic Air Pollution Using GIS. PhD Thesis. National Environmental Research Institute, Roskilde, Denmark, 165 p. - www.dmu.dk/1_viden/2_Publikationer/3_Ovrige/rapporter/SSJphd.pdf

Jensen, S.S., Berkowicz, R., Hansen, H. Sten., Hertel, O. (2001) A Danish decision-support GIS tool for management of urban air quality and human exposures. Transportation Research Part D: Transport and Environment, Volume **6**, Issue 4, 2001, pp. 229-241.

Hertel, O., Jensen, S. S., Andersen, H.V., Palmgren, F., Wåhlin, P., Skov, H., Nielsen, I. V., Sørensen, M., Loft, S., and Raaschou-Nielsen, O., (2001). Human Exposure to Traffic Pollution. Experience from Danish Studies. Pure and Applied Chemistry, Vol. **73**, No. 1, pp.137-145

AirGIS – tracking based

Hertel, O., Jensen, S.S., Hvidberg, M., Ketznel, M., Berkowicz, R., Palmgren, F., Wåhlin, P., Glasius, M., Loft, S., Vinzents, P., Raaschou-Nielsen, O., Sørensen, M., Bak, H. 2008, '[Assessing the Impact of Traffic Air Pollution on Human Exposures and Linking Exposures to Health](#)', in *Road Pricing the Economy and the Environment*, Springer, Berlin Heidelberg, pp. 277-299.

Description of Air Quality Models in the AirGIS System

OSPM:

Berkowicz, R., Hertel, O., Larsen, S.E., Sørensen, N.N. and Nielsen, M. (1997): Modelling traffic pollution in streets. National Environmental Research Institute, Roskilde, Denmark. ([report in PDF format](#), 850 kB).

Berkowicz, R. (2000) OSPM - A parameterised street pollution model, Environmental Monitoring and Assessment, Vol. **65**, Issue 1/2, pp. 323-331.

UBM:

Berkowicz, R., (2000). A Simple Model for Urban Background Pollution. Environmental Monitoring and Assessment Vol. **65**, Issue 1/2, pp. 259-267.

Simple Urban Background (SUB) Procedure

Berkowicz, R., Ketznel, M., Jensen, S.S., Hvidberg, M., Raaschou-Nielsen, O. (2008): Evaluation and application of OSPM for traffic pollution assessment for a large number of street locations. Environmental Modelling & Software, vol. **23** no. 3, pp. 296-303.

OML-Highway

Jensen, S.S., Becker, T., Ketznel, M., Løfstrøm, P., Olesen, H.R., Lorentz, H. (2010): OML-Highway within the framework of SELMAGIS. Final Report. National Environmental Research Institute, Aarhus University, Denmark, 26 p, NERI Technical Report No. 771. <http://www.dmu.dk/Pub/FR771.pdf>.

Emission factors

Ketzel M., P. Wåhlin, R. Berkowicz and F. Palmgren (2003): Particle and trace gas emission factors under urban driving conditions in Copenhagen based on street and roof level observations. *Atmospheric Environment* **37**, 2735-2749.

Berkowicz, R., Winter, M. and Ketzel, M. (2006): Traffic pollution modelling and emission data. *Environmental Modelling & Software* **21**, 454-460. ([doi-Link](#))

Ketzel, M., Omstedt, G., Johansson, C., Düring, I., Pohjola, M., Oettl, D., Gidhagen, L., Wåhlin, P., Lohmeyer, A., Berkowicz, R. (2007): Estimation and validation of PM_{2.5}/PM₁₀ exhaust and non-exhaust emission factors for practical street pollution modelling, *Atmospheric Environment*, vol. **41** no. 40, pp. 9370-9385.

Model validation intercomparison

Ketzel M, Berkowicz R, Hvidberg M, Jensen SS, Raaschou-Nielsen O. (2011): Evaluation of AirGIS - a GIS-based air pollution and human exposure modelling system. *International Journal for Environment and Pollution*. (In press).

Berkowicz R., M. Ketzel, G. Vachon, P. Louka, J-M. Rosant, P.G. Mestayer and J-F. Sini (2002): Examination of Traffic Pollution Distribution in a Street Canyon Using the Nantes'99 Experimental Data and Comparison with Model Results. *Water, Air and Soil Pollution: Focus* **2** (5-6), 311-324.

Ketzel, M., Berkowicz, R. and Lohmeyer, A. (2000): Comparison of Numerical Street Dispersion Models with Results from Wind Tunnel and Field Measurements, *Environmental Monitoring and Assessment*, Volume **65**, Issue 1/2, pp. 363-370

Specific modelling issues

Traffic produced turbulence TPT

Ketzel, M., Berkowicz, R., Müller, W.J. and Lohmeyer, A. (2002): Dependence of street canyon concentrations on above roof wind speed - implications for numerical modelling. *International Journal of Environment and Pollution* **17**, 356-366.

Di Sabatino, S., Kastner-Klein, P., Berkowicz, R., Britter, R. and Fedorovich, E. (2003): The modelling of turbulence from traffic in urban dispersion models – Part I: Theoretical considerations, *Environmental Fluid Mechanics* **3**, 129–143.

Kastner-Klein, P., Fedorovich, E., Ketzel, M., Berkowicz, R. and Britter, R. (2003) The modelling of turbulence from traffic in urban dispersion models – Part II: Evaluation Against Laboratory and Full-Scale Concentration Measurements in Street Canyons, *Environmental Fluid Mechanics* **3**, 145–172.

Model applications:

OSPM

See References in:

Kakosimos K.E., Hertel O., Ketzel M. and Berkowicz R. (2010): Operational Street Pollution Model (OSPM) - a review of performed validation studies, and future prospects. *Environmental Chemistry*, **7**, 485-503.

Soll-Johanning, H., Bach, E., Jensen, S.S. (2003): Lung and bladder cancer among Danish urban bus drivers and tramway employees: A nested case-control study. *Occupational Medicine* **53**: 25-33.

Raaschou-Nielsen, O., Hertel, O., Vignati, E., Berkowicz, R., Jensen, S. S., Larsen, V.B., Lohse, C., and Olsen, J.H., (2000). An air pollution model for use in epidemiological studies; evaluation with measured levels of nitrogen dioxide and benzene. *Journal of Exposure Analysis and Environmental Epidemiology*, **10**, 4-14.

Application of OSPM/AirGIS in Epidemiological Studies

Raaschou-Nielsen, O., Andersen, Z. J., Hvidberg, M., Jensen, S. S., Ketzel, M., Sørensen, M., Loft, S., Overvad, K. and Tjønneland, A. (2011): Lung Cancer Incidence and Long-Term Exposure to Air Pollution from Traffic. *Environmental Health Perspectives*. ([doi-Link](#))

Andersen, Z. J., Hvidberg, M., Jensen, S. S., Ketzel, M., Loft, S., Sørensen, M., Tjønneland, A., Overvad, K. and Raaschou-Nielsen, O. (2010): Chronic Obstructive Pulmonary Disease and Long-Term Exposure to Traffic-Related Air Pollution: A Cohort Study. *American Journal of Respiratory and Critical Care Medicine* **183**, 455-461

Raaschou-Nielsen, O., Bak, H., Sørensen, M., Jensen, S. S., Ketzel, M., Hvidberg, M., Schnohr, P., Tjønneland, A., Overvad, K. and Loft, S. (2010): Air pollution from traffic and risk for lung cancer in three Danish cohorts. *Cancer Epidemiology, Biomarkers & Prevention* **19**, 1284-1291.

Jensen SS, Larson T, Deepti KC, Kaufman J. (2009): Modeling traffic air pollution in street canyons in New York City for intra-urban exposure assessment in the US Multi-Ethnic Study of atherosclerosis and air pollution. *Atmospheric Environment*; **43**: 4544-56.

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Application of AirGIS in Air Quality Assessment and Management

Jensen, S.S., Ketzel, M., Berkowicz, R., Hvidberg, M., Høj, J. 2009: [Cleaner transport technology most efficient to ensure compliance with 2010 NO₂ limit values in Copenhagen, Denmark](#), *International Journal of Environment and Waste Management*, vol. **4** no. 1/2, pp. 179-196.

Hertel, O., Hvidberg, M., Ketzel, M., Storm, L. & Stausgaard, L. (2008): A proper choice of route significantly reduces air pollution exposure — A study on bicycle and bus trips in urban streets. *Science of The Total Environment* **389**: 58-70.